

REMARKS/ARGUMENTS

This Amendment and accompanying Remarks are submitted in response to the Office Action in the subject case, made Final, mailed on July 1, 2003. Applicants respectfully request entry of the Amendment into the file of the case and further reconsideration and examination in view thereof is respectfully requested.

Entry of this Amendment, including the amendments to certain of the claims, as presented hereinabove is deemed proper in that the amendments to the claims are believed to place all of the claims in condition for allowance, and, in the event that the Examiner remains unpersuaded as to the allowability of the claims as amended, the amendments to the claims are believed to reduce the issues on appeal in the event an appeal of the case is filed.

In the Office Action, claims 1-4, 7, 9-11, 13-23 and 28-35 were rejected under 35 U.S.C. 102 (b) as being anticipated by U.S. Patent No. 5,977,283 to Rossitto ("Rossitto").

Rossitto discloses a hot-melt adhesive with low application temperature (65 °C to 82 °C, col. 2, lines. 53/54 et seq.), comprising a partially reacted blend of an aliphatic polyester and a trifunctional isocyanate.

Independent claim 1 has been amended hereinabove to recite that the non-isocyanate-reactive polymer, wax and/or resin combines with said at least one isocyanate-reactive polymer wax and/or resin to form a matrix into which said at least one isocyanate is incorporated; and the "up to" language has been replaced by an indication that the maximum amount of said non-isocyanate-reactive polymer is 60 % w/w. The positive recitation of "at least" one non-isocyanate-reactive polymer, together with the maximum limit as to its amount are believed to overcome the Examiner's previous basis for rejection that the earlier claim language of "up to" also read on zero percent (i.e., no non-isocyanate-reactive polymer present).

In amended claim 1 the weight ratio with respect to the non-isocyanate-reactive polymer, wax and/or resin component — component (iii) — has been amended insofar as the "up-to" terminology" has been eliminated and instead the language "wherein the maximum amount of said non-isocyanate-reactive polymer, wax and/or resin is 60 % w/w relative to the reactive hot-melt adhesive element" has been used in order to clarify that technically significant amounts of component (iii) must be present within the inventive self-supporting reactive hot-melt adhesive element. Furthermore, the recitation "wherein said least one non-isocyanate-reactive polymer, wax and/or resin

combines with said least one isocyanate-reactive polymer and/or resin to form a matrix into which said least one isocyanate are incorporated” has been added to amended claim 1. This language clarifies and strengthens the argument that the non-isocyanate-reactive component (iii) must be present in technically significant amounts, i.e. this component may not be zero percent since otherwise there would be no non-isocyanate-reactive component (iii) to combine with the isocyanate-reactive polymer or resin to form a matrix into which the isocyanate is incorporated or embedded.

Similarly, claim 31 has been amended to recite that the composition of this claim is directed to a specific embodiment of the present invention wherein the isocyanate component comprises a mixture of at least two different di- or polyisocyanates, and wherein at least one of these isocyanates is unsymmetrically substituted comprising isocyanate functions of different reactivities.

In the Office Action, claims 1-3, 6, 7, 9, 11, 13-22 and 29 were rejected under 35 U.S.C. 102 (a) as being anticipated by U.S. Patent No. 6,087,463 to Tada ("Tada").

Tada discloses a reactive hot-melt adhesive comprising a blocked prepolymer made by reacting isocyanate groups with a blocking agent (claim 1).

The aforementioned amendment to claim 1 is also believed to overcome the basis for the Examiner's rejection in view of Tada, in that claim 1, as amended hereinabove, no longer reads on a zero percent content of non-reactive polymer, resin, or wax.

In contrast, the present invention teaches compositions relating to a self-supporting reactive hot-melt adhesive element comprising a one-component hot-melt adhesive. The present application also teaches a process for manufacture of the compositions, as well as their application and use. In addition, the present invention relates to an adhesive bonding or joining process for the permanent bonding or joining of parts or substrates.

The non-isocyanate-reactive component used according to the present invention leads to a high performance hot-melt adhesive element, since on the one hand a high degree of free NCO-groups is guaranteed because a premature reaction between the two reactive components is

avoided, and on the other hand, the presence of the non-isocyanate reactive component leads to a reduced tackiness of the surface of the inventive hot-melt adhesive element at room-temperature, so that the processability is much easier.

Based on the amendments to the two independent claims of the present application, claims 1 and 31, it has been clarified that technically significant amounts of the non-isocyanate-reactive polymer, resin and/or wax must be present in the self-supporting hot-melt adhesive element according to the present invention, because otherwise the nonisocyanate-reactive polymer, wax and/or resin could not combine with the isocyanate-reactive polymer and/or resin to form a matrix into which the isocyanate is incorporated or embedded. Thus, the non-isocyanate-reactive polymer, resin and/or wax must be present in amounts that significantly differ from zero percent.

Both Rossitto and Tada are silent with respect to requiring the presence of a third, non-isocyanate-reactive component in the form of a polymer, wax and/or resin, let alone in amounts up to 60 % w/w relative to the reactive hot-melt adhesive element. The compositions of the present invention have decisive advantages over the compositions of Rossitto and Tada, with regard to this non-isocyanate-reactive component.

“In view of the prior art described above, one object of the present invention is to provide a reactive hot-melt adhesive element that does not require a support element.

Another object of the present invention is to provide a reactive hot-melt adhesive element that can be easily stored and further processed, while having excellent adhesive properties. In particular, it should be possible to use such a reactive hot-melt adhesive material without any complicated melt-on and/or application devices.

Another object of the present invention is to provide a reactive hot-melt adhesive element that in particular has a high moisture and heat stability”

According to new, amended claim 1, the objects delineated before can be achieved by means of

a self-supporting reactive hot-melt adhesive element comprising:

a reactive one-component hot-melt adhesive which is solid at room-temperature, wherein said reactive one-component hot-melt adhesive comprises:

- (i) 0.5 to 30 % w/w relative to the reactive hot-melt adhesive element of at least one isocyanate which is solid or liquid at room-temperature;
- (ii) 20 to 90 % w/w relative to the reactive hot-melt adhesive element of at least one isocyanate-reactive polymer and/or resin which is solid at room-temperature; and
- (iii) at least one non-isocyanate-reactive polymer, wax and/or resin wherein the maximum amount of said non-isocyanate-reactive polymer, wax and/or resin is 60 % w/w relative to the reactive hot-melt adhesive element;

wherein the content of free NCO-groups in said reactive hot-melt adhesive element is at least 0.5 % w/w relative to the reactive hot-melt adhesive element and

wherein said least one non-isocyanate-reactive polymer, wax and/or resin combines with said least one isocyanate-reactive polymer and/or resin to form a matrix into which said least one isocyanate are incorporated, preferably in a homogeneous distribution.

According to another embodiment, that of amended independent claim 31, the objects delineated are achieved by means of

a self-supporting reactive hot-melt adhesive element, comprising:

a reactive one-component hot-melt adhesive which is solid at room-temperature, wherein said reactive-component hot-melt adhesive comprises:

- (i) 0.5 to 30 % w/w relative to the reactive hot-melt adhesive element of a mixture of at least two aliphatic and/or aromatic di- and/or polyisocyanates which are solid or liquid at room-temperature wherein at least one of said di- and/or polyisocyanates in said mixture is an unsymmetrically substituted di- and/or polyisocyanate comprising isocyanate functions of different reactivity; and
- (ii) 20 to 90 % w/w relative to the reactive hot-melt adhesive element of at least one isocyanate-reactive polymer and/or resin which is solid at room-temperature; and
- (i) at least one non-isocyanate-reactive polymer, wax and/or resin wherein the maximum amount of said non-isocyanate-reactive polymer, wax and/or resin is 60 % w/w relative to the reactive hot-melt adhesive element;

wherein the content of free NCO-groups in said reactive hot-melt adhesive element is at least as % w/w relative to the reactive hot-melt adhesive element and

wherein said least one non-isocyanate-reactive polymer, wax and/or resin combines with said least one isocyanate-reactive polymer and/or resin to form a matrix into which said least one isocyanate are incorporated, preferably in a homogeneous distribution.

According to both embodiments, namely that of amended claim 1 and that of amended claim 31, the inventive hot-melt adhesive element comprises - apart from isocyanates (i) and isocyanate-reactive polymers or resins (ii) - additionally at least one non-isocyanate-reactive polymer, wax and/or resin (iii) in a maximum amount of 60 % w/w relative to the reactive hot-melt adhesive element.

The addition of the non-isocyanate-reactive component has several decisive advantages: First, the processability of the reactive mixture is significantly improved since the two reactive components (isocyanates on the one hand and isocyanate-reactive polymers/resins on the other hand) are not in direct contact with each other so that the hot-melt adhesive element of the present invention can be easily formed into foils, films, strips or tapes. Second, due to the presence of the non-isocyanate-reactive component, no undesired premature reaction between the two reactive components (isocyanates on the one hand and isocyanate-reactive polymers/resins on the other hand) can take place, but only when the inventive hot-melt adhesive element is exposed to moisture and/or heat. Consequently, the presence of the non-isocyanate-reactive polymer, wax and/or resin also guarantees a high content of free NCO-groups in the inventive hot-melt adhesive element. Third, in addition, the presence of the non-isocyanate-reactive component has also the advantage that it leads to a reduced tackiness of the surface of the inventive hot-melt adhesive element at room-temperature so that the inventive hot-melt adhesive element can be easily processed into rolls; only when exposed to moisture and/or heat the inventive hot-melt adhesive element becomes sticky or tacky, i.e. the tackiness of the surface of the inventive hot-melt adhesive element can be easily controlled by the presence of the non-isocyanate-reactive component.

As recited according to amended claims 1 and 31, the non-isocyanate reactive component combines with the isocyanate-reactive component to form a matrix into which the isocyanate is incorporated or embedded

In addition to the presence of a third, non-isocyanate-reactive component, the embodiment of amended claim 31 is directed to an inventive hot-melt adhesive

element which comprises, as the isocyanate component, a mixture of at least two aliphatic and/or aromatic di- and/or polyisocyanates, which are solid or liquid at room-temperature wherein at least one of said di- and/or polyisocyanates in the mixture is an unsymmetrically substituted di- and/or polyisocyanate with isocyanate functional groups of different reactivity. This specific embodiment of the present invention has the decisive advantage that the isocyanate groups of low reactivity do not react with the isocyanate-reactive component and therefore remain unreacted in the inventive hot-melt adhesive element according to the present invention, thus ensuring a high content of free NCO-groups as specified in amended claim 31. Only when heat and/or moisture is applied during application, the NCO-groups of low reactivity are brought to reaction. In addition, the presence of unsymmetrically substituted isocyanates leads to a higher selectivity of the reaction and thus also to a higher storage stability and to higher process temperatures.

Consequently, the subject-matter of the present application, as recited according to the amended claims, is both novel over both Rossitto and Tada, and is also based on an inventive step since that is not anticipated by or rendered obvious over the disclosure of Rossitto and Tada, both taken individually, or in combination.

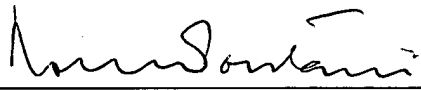
Accordingly, it is respectfully submitted that all pending claims of the present application, as amended by the instant Amendment, overcome all of the bases for the Examiner's rejection and are in condition for allowance, the early notification of which is earnestly solicited.

It is respectfully requested that the Examiner issue an Advisory Action in the present case as soon as possible and before expiration of a further extended period for response (i.e., third month extension of the time to respond to the present Office Action in the case), so as to enable applicants to elect to file an Appeal or a Request for Continuing Examination of the application in the event the Examiner remains unpersuaded as to allowability of the pending claims.

It is believed that no fees or charges are required at this time in connection with the present application; however, if any fees or charges are required at this time, they may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

Respectfully submitted,

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